UNDERSTANDING SUBGROUP IDENTIFICATION, TEAM IDENTIFICATION, AND INTERGROUP RELATIONS IN GLOBAL VIRTUAL TEAMS

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Summary

The aim of this study is to empirically examine subgroup dynamics in global virtual teams. Survey (N = 36) and interview data (N = 10) were collected from the students of three distant universities attending a global project course. Divided into eight teams, 56 students collaborated on company sponsored projects which addressed real business issues. The results demonstrated that identification with geographic subgroups was positively related to intergroup bias towards distant teammates. Intergroup bias was represented by favorable evaluation of collocated teammates. This study also found the detrimental impact of conflict on satisfaction. Whereas conflict with collocated teammates was harmful to satisfaction, conflict with distant teammates was not. The study demonstrated that identification with geographic subgroups plays a significant role in influencing how team members act in virtual teams. By showing that intergroup bias was primarily in the form of ingroup enhancement, this study proposes a possible explanation for the mixed results in the faultline research. This study also extends the analytical model of the effect of conflict to include social and psychological factors (expectation and subgroup boundary).

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Chapter 1 Introduction

Distributed collaboration is not a new phenomenon. Historically, people conducted such collaboration by travel and post (King & Frost, 2002). The rapid advances in information and communication technologies have presented new opportunities for organizations to integrate dispersed resources and expertise. Virtual teams, also called distributed or dispersed teams, consist of members who are guided by common purposes to carry out interdependent tasks across spatial, temporal and organizational boundaries, usually relying on computer mediated communication much more than face to face communication (Cramton, 2001; Lipnack & Stamps, 1997; Maznevski & Chudoba, 2000). Global virtual teams (GVTs) refer to teams whose members are globally distributed.

Research on virtual teams has received ample attention over the last decade (see Gibson & Cohen, 2003; Hinds & Kiesler, 2002). People have explored issues such as conflict (Hinds & Bailey, 2003; Hinds & Mortensen, 2005; Mortensen & Hinds, 2001), trust (Jarvenpaa & Leidner, 1999), structural dispersion (O'Leary, Hill, & Cummings, 2007), and mutual knowledge (Cramton, 2001).

One area of increasing interest to researchers is subgroup dynamics (Cramton & Hinds, 2005; Panteli & Davison, 2005; Polzer, Crisp, Jarvenpaa, & Kim, 2006). Geographic difference tends to become a salient category for self-categorization, and team members at the same location are likely to form into collocated subgroups. For example, in a case study of software development teams, Armstrong and Cole (1995) found that team members referred to their colleagues at the same location as “us” and

teammates at distant sites as “them”. Moreover, a study of student project teams done by Cramton (2001) found that team members were reluctant to communicate with people at distant sites and interacted more with their teammates at the same location. Cramton (2001) argued that geographic subgroups were likely to trigger ingroup -outgroup dynamics and called for more research on subgroup dynamics.

Subgroup dynamics is not unique to virtual teams, and it is also found in collocated work teams. However, due to the relatively explicit subgroup boundary created by geographic difference, virtual teams provide a good context to understand the formation, dynamics and effects of subgroups within work teams. Yet, empirical studies examining subgroup dynamics in the context of virtual teams are surprisingly rare, and there is limited understanding of inter-subgroup relations as well as how the formation of geographic subgroups influence team processes and outcomes.

This study seeks to empirically examine how people collaborate with each other while facing spatial, temporal and cultural differences. Specifically, the aim of the study is (1) to explore how social identification influences inter-subgroup relations in the context of virtual teams; and (2) to investigate how the impact of conflict on team outcomes differs due to the influence of social and psychological factors.

A web-based survey was administrated among the students from three distant universities attending a global project course. Follow-up interviews were conducted to obtain a better understanding of the team processes and outcomes. The study presents the results from testing hypotheses and interpreting interviews, and concludes with a discussion of theoretical and managerial implications, limitations as well as directions

for future research.

Chapter 2 Literature Review

This chapter will first review previous research on subgroup dynamics within work teams, and then present the major theoretical framework of this study as well as research hypotheses.

2.1 Previous Research on Subgroup Dynamics within Work Teams

2.1.1 Faultlines and Subgroups

2.1.1.1 The Concept of Faultlines

Increasing interest in subgroup dynamics within work teams has been partially attributed to a new branch of diversity research which explores combinations of correlated dimensions of diversity. Lau and Murnighan (1998) introduced the concept of "group faultline", which provided a new explanation for the diversity impact. "Faultlines" are "hypothetical dividing lines that may split a group into subgroups based on one or more attributes" (p.328). Group faultlines are analogous to fractures in the earth's crust. According to Lau and Murnighan (1998), it is not the total amount of diversity that impacts group integration. Rather, it is "faultlines", such as demographic attributes and organizational affiliations, that separate a group into distinct subgroups. Whether a faultline is activated depends on the group's task context. For example, Lau and Murnighan argued that "retirement and pension issues may activate faultlines based on age" or "resource allocation decisions may lead to group fragmentation based on members' occupational roles" (p.328). Although Lau and Murnighan did not explicitly link the faultline model to social identity perspective, their arguments actually corresponded to self-categorization theory in that the

accessibility of the social category is one of the requirements for the particular category to become salient (Oakes, 1987). Accessibility refers to the ease of activating social categorization. The more accessible the category is, the less effort is required to invoke the categorization.

Furthermore, Lau and Murnighan (1998) argued that faultlines became stronger when more attributes were correlated. For instance, a group composed of Asians and Caucasians would have stronger faultlines when all the Asians happened to be men and all the Caucasians happened to be women. This notion also corresponds to the social identity perspective in that the salient social category fits the available information to the degree that it maximizes the contrast between inter-category differences and intra-category similarities, known as comparative fit (Oakes, 1987).

Lau and Murnighan (1998) believed that the actual formation of subgroups could have negative effects on internal communication and group functioning due to the ingroup-outgroup dynamics resulted from subgroup categorization.

2.1.1.2 Testing the Faultline Model

Following the work of Lau and Murnighan (1998), studies testing the faultline model have yielded inconsistent findings. The relationship between faultline strength and group outcomes ranges from curvilinear (Gibson & Vermeulen, 2003; Thatcher, Jehn, & Zanutto, 2003) to positive (Lau & Murnighan, 2005) and negative one (Li & Hambrick, 2005).

One reason for the mixed findings is that different studies measure faultline strength in different ways. Whereas Thatcher, Jehn and Zanutto (2003) measured

faultline strength by calculating the percentage of the total variation in overall group characteristics accounted for by the strongest subgroup split, Gibson and Vermulen (2003) computed subgroup strength by taking the standard deviation in overlap of demographic characteristics across the different pairs. Li and Hambrick (2005), on the other hand, measured the factional faultline by calculating the degree of differences between factions. The underlying assumption is the same for different studies, which is to measure combination of correlated dimensions of diversity. However, the variation in operationalization may engender discrepancy in findings.

Another explanation for the discrepancy in empirical findings is that faultlines are simply potential forces for the actual formation of subgroups. Although some studies have tried to establish the convergent validity of the measure of subgroup strength by correlating survey data with interview data (e.g., Gibson & Vermeulen, 2003), most research seems to assume strong faultlines are equivalent to strong subgroups without further evidence. However, whereas the faultline effect is more likely to exist in "factional groups" in which "team members are representatives, or delegates, from a small number of social entities and are aware of, and find salience in, their delegate status" (Li & Hambrick, 2005, p. 794), it may not be equally effective in teams in which the subgroup boundary is less obvious. According to Thatcher, Jehn and Zanutto (2003), an subgroup only exists when people identify with certain grouping and categorize themselves as part of it. Moreover, Kiduff, Angelmar and Mehra (2000) found that demographic diversity did not necessarily signal variation in underlying cognitive processes. Finally, most studies do not test the underlying

processes that convert faultlines to group processes and outcomes, which makes their results less interpretable.

2.1.2 Geographic Difference as a Faultline

The faultline model has been extended to the context of virtual teams, in which geographic difference tends to be a salient faultline (Cramton & Hinds, 2005). Geographic difference has three critical dimensions, which include spatial, temporal and configurational distribution (O'Leary et al., 2007). The notion of geographic difference as a faultline mainly touches on the spatial dimension. However, it does not focus on the spatial distances between sites. Instead it refers to the dichotomy of "collocated" and "distant" sites. By using the difference in geographic locations as the basis for self-categorization, people perceive collocated teammates as ingroup members and distant teammates as outgroup members.

There are several reasons why geographic difference tends to be the salient basis for self categorization. Firstly, due to the geographic difference, people have limited face to face meetings and largely rely on technology mediated communication. Technology mediated communication reduces social cues such as gender and ethnicity, which are less readily available and thus less likely to become salient faultlines. By contrast, geographic difference is relatively available. When collocated team members have face to face meetings among themselves apart from the entire team, a salient social category divides the whole team into those who are present and who are not (Polzer et al., 2006).

Secondly, people at the same location tend to share contextual information such

as information about local settings and constraints. Lack of contextual information about distant team members may cause inaccurate attributions about their behaviors and hence strengthen local subgroup identification (Cramton & Hinds, 2005).

Thirdly, geographic difference may co-vary with cultural difference or difference in functional background, such that people in the same location tend to share similar cultural backgrounds or functional backgrounds. The more differences co-vary with the geographic difference, the higher the comparative fit, and the more likely subgroup categorization based on locational difference will occur. This notion is supported by a study done by Polzer, Crisp, Jarvenpaa and Kim (2006). They found faultlines became stronger when location-based subgroups were homogeneous in nationality.

The empirical studies so far that have addressed issues of subgroup dynamics in virtual teams have focused on the configurational effects. Geographic configuration is defined as the number of geographic locations and the arrangement of team members across locations independent of spatial and temporal distances among them (O'Leary et al., 2007). Polzer et al. (2006) compared different levels of configurational dispersion and found that faultlines became stronger when a team consisted of two equally sized collocated subgroups. Teams with two members at three locations had moderate levels of conflict and trust, while teams with one member at six different locations demonstrated the lowest levels of conflict and highest levels of trust. This finding is in line with Lau and Murnighan's proposition (1998) that two subgroups comparable in size tend to experience more conflict. Unlike previous studies which

mainly focused on balanced subgroups (with equal number of people in each subgroup), O'Leary and Mortensen's quasi-experiment (2008) explored the effects of uneven distribution of team members. They found that subgroups with numerical minority of team members had less shared team identity, less effective transactive memory (defined as "a set of individual memory systems in combination with the communication that takes place between individuals", Wegner, 1987, p. 186), more conflict and more coordination issues. The reason is that minorities have greater need for solidarity and therefore categorization effects are strengthened. The unevenness in the size of subgroups results in the perception of inequality and heightened tension between subgroups. Moreover, teams with isolated members (with majority people at one site and only one team member at the distant site) outperformed both balanced and unbalanced configurations. Without collocated teammates to form the ingroup, isolated team members are likely to identify with the team and engage in positive team behaviors. Isolates also provide a weak outgroup basis for the rest of the team, therefore, less likely to trigger ingroup-outgroup dynamics (O'Leary & Mortensen, 2008).

2.2 Theory and Hypotheses

Although not explicitly stated in the faultline research, social identity approach provides the theoretical foundation to explain the effects of faultlines on team processes and outcomes. It is also the major theoretical framework in this study. Initially developed to explain intergroup relations and group processes in the large social context, social identity approach has been applied in organizational settings for

a long time (Hogg & Terry, 2000). Intergroup relations can exist between organizations, between departments within organizations, between work teams within departments, and even between subgroups within teams.

2.2.1 Social Identity Approach

Social identity is defined as "the individual's knowledge that he belongs to certain social groups together with some emotional and value significance to him of the group membership" (Tajfel, 1972, p. 292). Social identity theory, in the broadest sense, refers to a body of ideas shared by social identity researchers to explain intergroup relations and group processes (Hogg & Abrams, 1988).

2.2.1.1 Assumptions of Social Identity Approach

Social identity approach is built on certain assumptions. First, it states that society is composed of social categories which vary in status, power and prestige. Social categories change as responses to the change in forces of economics and history (Hogg & Abrams, 1988). Second, social identity is part of people's self concept, which derives from the social categories (e.g., gender, nationality, race, occupation) to which they belong (Hogg & Abrams, 1988). Social identity is qualitatively different from personal identity which indicates individual attributes (Gergen, 1971). When social identity is salient, people are more likely to demonstrate group behaviors.

2.2.1.2 Theoretical Propositions of Social Identity Approach

Categorization and social comparison are the key processes underlying group behaviors. First, people adopt social identity through self-categorization, which results

in an accentuation of similarities between self and other ingroup members and differences between self and other outgroup members (Turner, 1985; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Self-categorization process could satisfy people's need of subjective uncertainty reduction by employing the group prototype as the self representation, known as the uncertainty reduction hypothesis (Hogg, 2000). Group prototypes are defining characteristics of the group, which prescribes perceptions, attitudes, feelings and behaviors. Individuals are transformed into groups through self-categorization (Hogg & Abrams, 1988).

Second, social comparison is an important process through which intergroup differentiation becomes possible. People are motivated to make social comparison in order to obtain confidence in their beliefs and perceptions (Festinger, 1954). People also tend to satisfy their fundamental self-esteem needs by maximizing differences between ingroup and outgroup on the dimensions which favor positive ingroup distinctiveness (Tajfel & Turner, 1979). This is driven by the need of self-esteem enhancement, known as the self-esteem hypothesis (Abrams & Hogg, 1988). Since social identity is an important part of self-concept, a positive social identity brings individual a sense of well-being.

2.2.2 Intergroup Bias

Intergroup bias refers to the tendency to evaluate the ingroup more favorable than the outgroup (Hewstone, Rubin, & Willis, 2002). Social identity approach has been the major theoretical framework to explain the link between group identification and intergroup bias. Previous research has indicated that merely categorizing people

into different groups is sufficient to engender intergroup bias, even if the grouping method is arbitrary (Brewer, 1979). For example, a series of experiments designed as "minimal group paradigm" (which requires absence of face to face interaction among participants, complete anonymity of group membership, and irrelevance between the nature of response and the basis for group categorization) have found that people favored the ingroup over the outgroup in the allocation of rewards. People were also found to maximize the difference between the ingroup and the outgroup even at the cost of sacrificing alternative strategies which could bring them more rewards (Tajfel, Billig, Bundy, & Flament, 1971).

As mentioned earlier, social identity theory argues that people strive to maintain a positive social identity through social comparison, because social identity is an important part of self-concept (Tajfel & Turner, 1979). Therefore the more people identify with a social group, the more people's self-esteem depends on the positive social identity, and thus the more likely they engage in intergroup differentiation. This notion has been supported by recent research, in which subgroup identification has been found to be positively correlated with intergroup bias. For instance, a study done in the context of shipyard found that employees' identification with subcontractors was positively related to intergroup bias towards other subgroups at the shipyard (Lipponen, Helkama, & Juslin, 2003). Similarly, Stone and Crisp (2007) found that British (subgroup) identification was positively associated with bias towards other subgroups.

Intergroup bias is often represented by ingroup enhancement rather than

outgroup devaluation (Brewer, 1979, 1999). As Brewer (1999) put, “discrimination between ingroup and outgroups is a matter of relative favoritism towards the ingroup and the absence of equivalent favoritism towards outgroups (p. 434).” Identification with the group brings ingroup members closer to the self, while the distance between the self and outgroup members remains unchanged. Nevertheless, ingroup-outgroup differentiation, whether it is in the form of pro-ingroup or anti-outgroup, can create different perceptions and expectations (Gaertner, Dovidio, Anastasio, Bachman, & Rust, 1993). The initial ingroup favoritism may escalate into negative intergroup relations.

As mentioned earlier, in the context of virtual teams, geographic difference tends to become a salient category to divide the whole team into several geographic subgroups (Cramton & Hinds, 2005). People perceive collocated teammates as ingroup members and distant teammates as outgroup members. Taken together, this study hypothesizes that:

Hypothesis 1a: Subgroup identification will be positively related to evaluation of collocated teammates.

Hypothesis 1b: Subgroup identification will be positively related to intergroup bias.

2.2.3 Team Identification

Team identification refers to identification with the team as a whole. Most of the past research assumes there is a negative relationship between subgroup identification and team identification (Fiol & O'Connor, 2005). The rationale is that subgroup

identification distracts attention from the team as a whole and renders the team as a less salient identification target. However, people can adopt dual identities, where identification occurs with both the subgroup and the superordinate group (Hornsey & Hogg, 2000). In an experimental study of interorganizational teams, Rocmann, Pratt and Northcarft (2007) found that subgroup (home organization) identification did not preclude developing team (interorganizational team) identification. The relationship between subgroup identification and team identification was moderated by the factors of physical arrangement of team members and communication medium richness. They found that the highest levels of team identification occurred for people with strong subgroup identification in integrated teams, in which every location included team members from both organizations. Being in the integrated team, team members were motivated to pay attention to both collocated teammates and fellow home organization colleagues, therefore, increased overall team identification. They also found that rich communication (video and audio) was most beneficial for enhancing team identification when used by people with weak subgroup identification. Rich social cues resulted from using rich media helped to make the team category salient.

Derived from the social identity theory, the Common Ingroup Identity Model (CIIM) argues that introducing a superordinate identity could reduce intergroup bias by transforming the representation of two groups into one inclusive superordinate group (Gaertner & Dovidio, 2000; Gaertner et al., 1993). By manipulation of seating arrangement, nature of the independence among team members or assignment of names (one group name versus two subgroup names), a series of studies have

confirmed that one-group representation reduces intergroup bias (Gaertner et al., 1993). Bias is reduced primarily by increasing the attractiveness of former outgroup members. With the common ingroup identity, the former outgroup members are perceived as ingroup members and evaluated more positively.

CIIM has been supported by both laboratory and field research (e.g., Gaertner, Mann, Murrell, & Dovidio, 1989; Gaertner, Rust, Dovidio, Bachman, & Anastasio, 1994). This model works in both "one-group" and "dual-identity" condition (Gaertner et al., 2000). For instance, a study of students' attitudes in a multi-ethnic high school found that people who identified with American (superordinate identity) as well as their ethnic group (subordinate identity) demonstrated less bias than did the students who only held subordinate identity (Gaertner et al., 1994).

Furthermore, CIIM would be more effective in reducing intergroup bias if the superordinate group is not overly inclusive (Hornsey & Hogg, 1999), or the subgroups are situated in the contact setting (Gonzalez & Brown, 2003). Apparently most often the team category is not overly inclusive. Team members need to interact with each other in order to carry out interdependent tasks. Therefore this study hypothesizes that:

Hypothesis 2a: Team identification will be positively related to evaluation of distant teammates.

Hypothesis 2b: Team identification will be negatively related to intergroup bias.

2.2.4 Conflict in Virtual Teams

Conflict in virtual teams has become an active research area in recent years. One

of the reasons why conflict has gained interest is that previous research has found virtual teams experience severe conflict (Armstrong & Cole, 1995; Cramton, 2001). Although the relationship between conflict and performance is well established through decades of research, it is still unclear whether the impact of conflict on virtual teams can be predicted by existing models which are built in the context of collocated teams.

2.2.4.1 Conflict Types

Conflict is defined as "an interactive process manifested in incompatibility, disagreement, or dissonance within or between social entities (i.e., individual, group, organization, etc.)"(Rahim, 2001, p.18). Conflict can be classified into three dimensions, which include relationship, task and process conflict (Jehn, 1995, 1997; Jehn, Northcraft, & Neale, 1999). Relationship conflict (also known as affective or interpersonal conflict) refers to disagreements about personal issues, such as personality clashes or distrust. Task conflict (also known as cognitive or functional conflict) refers to incompatibilities among team members about the task being performed. Process conflict refers to disagreements about how a task should be accomplished (Jehn, 1997).

2.2.4.2 Antecedents of Conflict

2.2.4.2.1 Team Diversity, Social Identity and Similarity Attraction

Research on team diversity has explored different dimensions of diversity such as demographic diversity (differences in age, gender and ethnicity), functional diversity (differences in educational background) as well as differences in values,

personality and attitudes (van Knippenberg & Schippers, 2007; Williams & O'Reilly, 1998). The theoretical foundation for the impact of diversity on conflict is the social identity approach and similarity / attraction paradigm. According to the social identity approach, diversity triggers different bases for self-categorization and thus promotes the ingroup-outgroup dynamics. Consistent with the prediction of the social identity approach, similarity / attraction paradigm argues that similarity provides attitude reinforcement, while dissimilarity is considered negative and engenders conflict (Byrne, 1971).

The empirical research on the relationship between diversity and conflict has resulted in relatively consistent findings. For example, Vodosek (2007) found there was a positive relationship between cultural diversity and all three types of conflict which include relationship, task and process conflict. Moreover, Pelled, Eisenhardt and Xin (1999) found that functional diversity was positively related to task conflict, while both tenure and race diversity were positively associated with relationship conflict. Similarly, Jehn (1999) discovered that informational diversity increased task conflict, while social category diversity increased relationship conflict, and value diversity increased all three types of conflict. Furthermore, Williams and O'Reilly (1998) concluded from their review of 40 years of research that diverse groups are more likely to experience more conflict.

The issue of diversity is especially relevant in virtual teams, not only because virtual teams span across geographical boundaries, but also because they are often formed for the purpose of integrating different expertise. Therefore, the issues of

cultural diversity and functional diversity tend to be prevalent in virtual teams. Virtual teams that are culturally heterogeneous have been found to report less task and relationship conflict than culturally homogenous teams (Kankanhalli, Tan, & Wei, 2006; Mortensen & Hinds, 2001). One explanation for the unexpected finding is that cultural diversity may not represent underlying variation in cognitive processes in this case. Another explanation is that culturally heterogeneous teams may make some conscious efforts to avoid potential conflict.

2.2.4.2.2 Communication Technology and Geographic Difference

Virtual team members rely on technology to communicate with each other. Although collocated teams are found equally reliant on technology, the task conflict resulted from technology mediated communication is less than that of virtual teams (Mortensen & Hinds, 2001). Communicating through technology may engender conflict by uneven distribution of information, lack of shared context information, misinterpretation of silence, and discrepancy in salience of information (Cramton, 2001).

Hinds and Bailey (2003) proposed a framework to understand the antecedents of conflict in virtual teams. According to them, the antecedents can be categorized into two factors, namely geographical distance and technology mediated communication. These two factors are not included in the existing models based on collocated teams, in which team members are usually at the same location and have frequent face to face communication. They argued that the factor of geographical distance has negative impacts on shared context, familiarity, friendship and homogeneity, resulting

in heightened conflict. They further proposed that the factor of technology mediated communication triggers detrimental effects on relational outcome, information transfer and coordination, all of which engender conflict. The reason is that technology has certain constraints and thus requires more effort in order to achieve effective communication.

2.2.4.3 Effects of Conflict on Performance and Satisfaction

2.2.4.3.1 Effect of Conflict on Performance

A large body of research has examined the impact of conflict on team performance in the collocated team setting. Whereas a negative relationship between affective conflict and performance is supported by a substantial number of studies, the relationship between task conflict and performance is vague. Some studies have found a positive relationship between task conflict and performance, supporting the task versus relationship conflict perspective (Jehn, 1994). It is partly because task conflict renders thorough discussion and critical evaluation (Jehn, 1995). However, in support of the information processing perspective, some studies found task conflict diminishes performance (Jehn et al., 1999; Lovelace, Shapiro, & Weingart, 2001). Information processing perspective suggests a moderate negative relationship between conflict and team performance. The initial conflict facilitates information processing. Teams could improve decision quality by considering a variety of ideas. However, the intensified conflict impedes team performance, because intensified task conflict is likely to engender relationship conflict. In addition, some research suggests the effect of task conflict is contingent on task characteristics such that task conflict is beneficial to

team performance when teams perform nonroutine tasks (Jehn, 1995). A meta-analysis by De Dreu and Weingart (2003) reported a negative correlation between task conflict and performance, especially in teams with complex and uncertain tasks. Besides, task conflict is consistently found to be detrimental to team performance in virtual teams (Hinds & Mortensen, 2005; Mortensen & Hinds, 2001). Thus this study predicts that relationship conflict and task conflict will have negative impact on team performance.

Hypothesis 3a: Relationship conflict will be negatively related to team performance.

Hypothesis 3b: Task conflict will be negatively related to team performance.

Process conflict has been the least examined among the three types of team conflict. As aforementioned, technology mediated communication has negative impact on information transfer and coordination, both of which then make process conflict a salient issue in the context of virtual teams (Hinds & Bailey, 2003). For example, process conflict is likely to be resulted from uneven distribution of information, such that people are excluded from communication purposely or accidentally. Process conflict is also likely to arise when technology mediated communication makes it difficult to coordinate the use of shared resources. Previous research found process conflict has negative impact on team outcomes such as group morale and work effectiveness (Jehn, 1997; Jehn et al., 1999). Besides, the task conflict will be resolved less readily due to the constraint of mediating technologies, and will more likely to engender interpersonal conflict. So this study expects that

process conflict will diminish team performance.

Hypothesis 3c: Process conflict will be negatively related to team performance.

2.2.4.3.2 Effect of Conflict on Satisfaction

Both relationship conflict and task conflict have been consistently found to have negative impact on team member satisfaction (De Dreu & Weingart, 2003; Jehn, 1995). Relationship conflict elicits negative reactions such as anxiety and frustration, so it is highly harmful to satisfaction. Similarly, task conflict creates tension and dissatsfaction (Jehn, 1995). Besides, process conflict also have been found to diminish satisfaction (Jehn, 1997). When a team argues about who should do what, the uncertainty caused by the process conflict results in low satisfaction and high turnover. Therefore this research hypothesizes that all three types of conflict will be detrimental to satisfaction.

Hypothesis 4a: Relationship conflict will be negatively related to satisfaction.

Hypothesis 4b: Task conflict will be negatively related to satisfaction.

Hypothesis 4c: Process conflict will be negatively related to satisfaction.

2.2.4.4 Conflict with Ingroup Members and Conflict with Outgroup Members

Conflict was measured at the team level in the existing virtual team research (Hinds & Mortensen, 2005; Mortensen & Hinds, 2001). It is likely that people have been thinking about the collocated subgroup rather than the whole team when answering the questions (Hinds & Mortensen, 2005). Furthermore, by using a team level construct, it is not possible to differentiate between conflict with collocated teammates and conflict with distant teammates. It is likely that conflict with ingroup

members and conflict with outgroup members will have different impacts on team performance and satisfaction. Therefore this research explores whether conflict with collocated teammates and conflict with distant teammates have different effects on team outcomes, which has been neglected by previous research. In this research, two social and psychological factors, expectation and subgroup boundary, are considered as potential factors to influence the impact of conflict.

2.2.4.4.1 Expectancy Violations Theory

Expectancy violations theory states that expectancies have influence on patterns and outcomes of people's interactions, and on their impressions of one another (Burgoon, 1995).Violations of expectations shift people's attentions to the violator and the meanings of violations, and both communicator valence and violation valence moderate the effects of violations on interaction patterns and interaction outcomes. Violation valence refers to the attributes of the violation behavior, whereas communicator valence refers to the characteristics of the violation actor. Positive violations are predicted to result in more favorable outcomes than expectancy confirmations, whereas negative violations are expected to yield more unfavorable consequences than conforming to expectations. For example, an unexpected gift will be more rewarding than an expected one due to its positive valence. By contrast, an unexpected insult will be more unfavorable than an expected one because of its negative valence. When the meanings of violations are ambiguous, communicator valence will be significant in determining the meanings of the violations, such that highly regarded communicators are more likely to be attached to positive

interpretation of violations than poorly regarded communicators. For instance, an abrupt class absence without further information is a violation open to multiple interpretations. If it is committed by a brilliant student, it may be interpreted as the outcome of some emergency problem. However, the same behavior acted by a disliked student may be interpreted as an intentional class skipping.

Originally limited to understand space violation (Burgoon, 1978), expectancy violations theory has been expanded to explain a wide range of expectancy violations. Recent research on diversity effect has demonstrated support for expectancy violations theory. For example, in an experimental study of work goal differences between self and same/opposite-gender partners, Rink and Ellemers (2006) found that the violation of gender based expectation of work roles resulted in more disappointment, less clear image of the partner and less commitment towards future collaboration.

2.2.4.4.2 Conflict with Collocated Teammates and Conflict with Distant Teammates

People assume attitudes and beliefs more similar to ingroup members than to outgroup members (Allen & Wilder, 1975, 1979; Holtz & Miller, 1985). One reason is that social categorization processes accentuate the similarities between self and ingroup members and differences between self and outgroup members (Hogg & Abrams, 1988). Another reason is that ingroup members are more desirable than outgroup members, and research has demonstrated that people assume greater similarity between themselves and desirable others (Marks & Miller, 1982; Marks,

Miller, & Maruyama, 1981).

This research argues that team members expect reinforcement of attitudes and beliefs from their collocated teammates. This reasoning was not only because that collocated teammates are treated as ingroup members, but also because that collocated team members tend to share similar cultural backgrounds and functional backgrounds. Therefore, when conflict with collocated teammates arises, it will tend to be perceived as a violation of expectation. Due to the negative valence of conflict, an expectancy violation will yield more unfavorable outcomes than an expectancy confirmation, according to the expectancy violations theory as aforementioned. By contrast, people expect certain differences from distant teammates, thus conflict with distant team members is more likely to be perceived as a confirmation rather than a violation of expectation. Thus the impact of conflict with distant teammates (expectancy confirmation) will be less unfavorable than conflict with collocated teammates (expectancy violation).

Besides, previous research also found that people are better able to recognize and use new information from group members who were previously unknown than information from those they are already familiar with (Phillips, 2003). Therefore, team members are more likely to seek novel information and see the value of difference when task conflict arises with distant teammates compared to task conflict with collocated teammates. As a result, task conflict with distant teammates is more likely to benefit performance than that with distant teammates.

Moreover, conflict will become intense if people have frequent encounters with

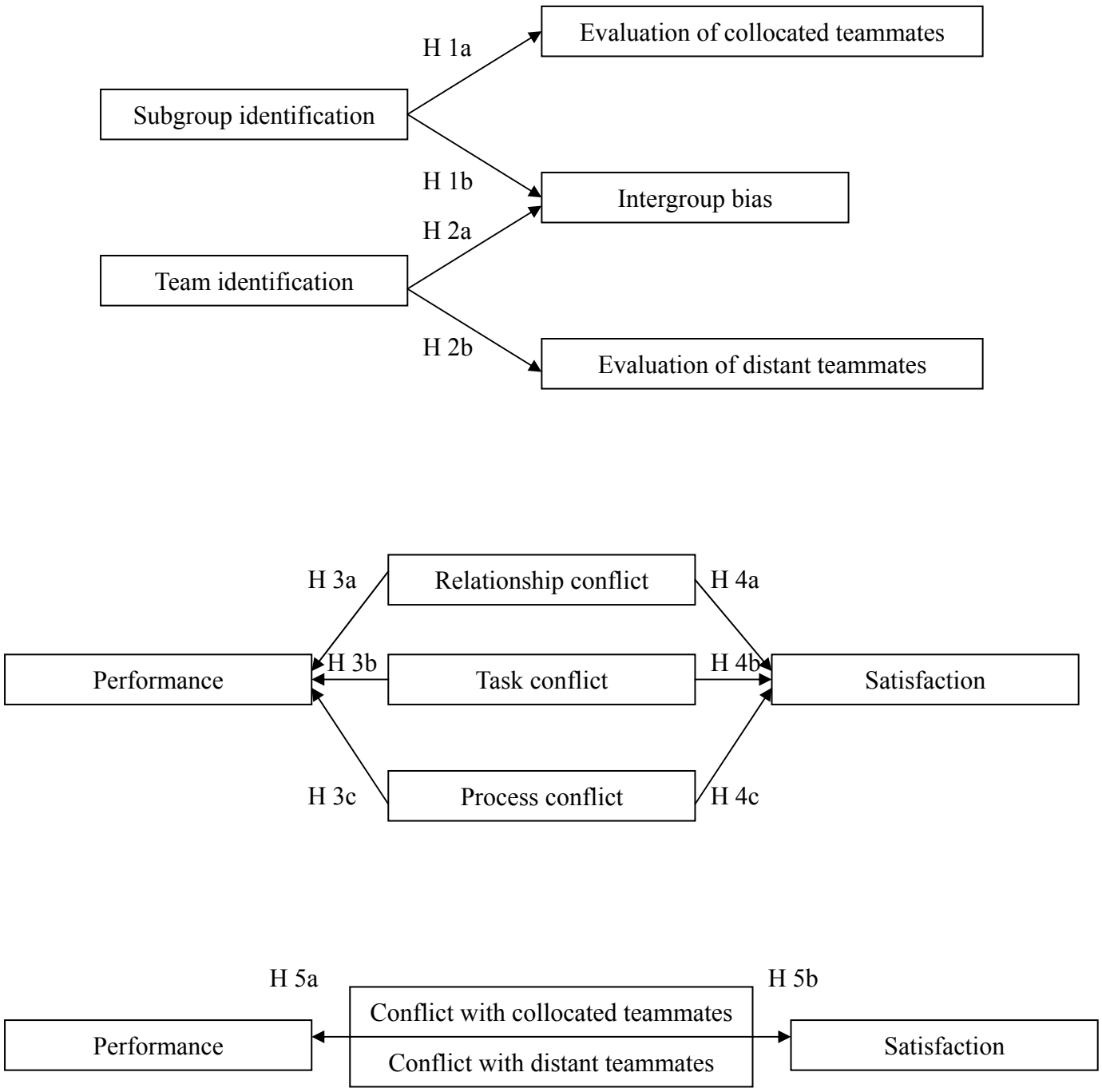
each other and leave the conflict unsolved. This is especially true for interpersonal conflict. By contrast, conflict with distant teammates will less likely be intensified since people have less opportunity for face to face encounters.

Taken together, this study predicts that conflict with collocated team members will be more detrimental to team performance and satisfaction compared to conflict with distant team members.

Hypothesis 5a: Conflict with collocated teammates will be more negatively related to team performance than will conflict with distant teammates.

Hypothesis 5b: Conflict with collocated teammates will be more negatively related to satisfaction than will conflict with distant teammates.

Figure 1 Summary of Hypotheses



Chapter 3 Methods

3.1 Research Setting

The data for this study were collected from the students who participated in a global-project course. In this master's level course, students worked on company-sponsored projects for ten weeks. Assigned with a global supply chain management issue by the sponsoring company, students were expected to design questionnaires and collect data through interviews with business executives as well as experts in the field of supply chain management. Based on the interview data and literature research, they prepared a final report of solutions.

These student teams were chosen for study because to some extent they simulated real organizational teams. First of all, the team projects addressed real business issues, which were formulated and assessed by the company sponsors. Students were assigned to teams by the course faculty according to their interests and skills. Secondly, most of the students had previous working experiences, so these project teams were expected to be more professional than normal student teams. Thirdly, team members had face to face meetings with their distant partners, which was common for real organizational teams but rare for student teams working on the global projects. Besides, the time period of ten weeks was relatively extensive for student projects.

All the team members met face to face once at one university for the project kick-off and once at the other university for the final presentation. Most of the time during the ten-week collaboration, team members communicated with each other by a

wide range of communication technologies such as email, telephone, and video conferencing. They also maintained frequent contact with the course faculty and the company sponsors, from whom they could seek clarifications and suggestions. The project deliverable was a final report based on the data collected from interviews and library research. Also, teams reported their results to the company sponsors and the course faculty in the form of power-point presentation at the end of the course.

3.2 Sample

In total, there were 56 students who have attended this global-project course in the same academic year. Thirty-five students from one university in the US and one in Hong Kong attended the winter session of the course. They formed five teams and each team had seven members. Twenty-one students from the same university in the US and one in the Netherlands participated in the spring session of the course. They formed three teams, of which two had six members while the other had nine. The characteristics of the teams are summarized in Table 1.

Thirty-six out of fifty-six students participated in this study, with a response rate of 64.3%. Table 2 summarizes the descriptive statistics of the respondents. Of the 36 respondents, the number of males (66.7%) was twice of the number of females (33.3%). Ranging from 21 to 32, the average age of participants was 25 years old. While 58.3% of the respondents were students from the university in the US, 25% were from the university in Netherlands and the rest 16.7% were from the university in Hong Kong. This ratio is basically consistent with the ratio of the course enrollment, which was 51.8% from US, 19.6% from Netherlands and 28.6% from

Table 1 Characteristics of Teams in Sample

Team	Course session	Size	University
1	Winter	7	3 US 4 Hong Kong
2	Winter	7	5 US 2 Hong Kong
3	Winter	7	4 US 3 Hong Kong
4	Winter	7	3 US 4 Hong Kong
5	Winter	7	4 US 3 Hong Kong
6	Spring	6	3 US 3 Netherlands
7	Spring	6	3 US 3 Netherlands
8	Spring	9	4 US 5 Netherlands

Table 2 Descriptive Statistics of Respondents

Group (*N*=36)	Frequency	Percentage
Gender		
Male	24	66.7
Female	12	33.3
Age (*M*=25)		
21-24	15	41.7
25-28	17	47.2
29-32	4	11.1
Location		
US	21	58.3
Netherlands	9	25
Hong Kong	6	16.7
Working experience		
None	9	25
Less than one year	8	22.2
1-3 years	17	47.2
4-6 years	2	5.6
Previous virtual team experience		
None	17	47.2
Once	10	27.8
Twice	4	11.1
Three times	1	2.8
Four times or more	4	11.1

Hong Kong. Seventy-five percent of the respondents had working experiences before. Among the respondents who had working experiences, 92.6% of them had worked for less than four years. More than half of the respondents (52.8%) had the experience of working in a virtual team before they participated in the global project.

3.3 Data Collection

By the time of data collection for this study, all the teams had already finished the projects. Consent was obtained from the course faculty, who provided the team list and also helped to forward the survey invitation to the students by email. Later a detailed survey invitation was sent to the 56 students and followed by three rounds of reminders. The web survey was selected as the mode of administration because it was easily accessible to all students although they were in different continents. The survey took approximately 10-20 minutes to finish.

In order to increase the response rate, the first survey reminder started to introduce an incentive. People were rewarded a 15 US dollars check or a gift certificate by completing the survey.

To better understand the team processes and outcomes, follow-up face to face interviews were conducted to supplement the survey data. The interviews ranged from 20 to 45 minutes long. All the 10 interviews were audio recorded and transcribed for analysis.

3.4 Measures

Survey items measuring main variables are summarized in Table 3.

3.4.1 Subgroup Identification

Table 3 Survey Items Measuring Main Variables

Survey items	α	Item adaptation basis
Subgroup identification	0.87	Hinkle, Taylor and Fox-Cardamone (1989); Allen and Meyer (1990)
I identify with teammates in the same location.		
I feel emotionally attached to teammates in the same location.		
I feel a strong sense of belonging to teammates in the same location.		
Team identification	0.73	Mael and Tetrick (1992)
I'm very interested in what others think about this project team.		
When I talk about this project team, I usually say "we" rather than "they".		
This project team's successes are my successes.		
When someone praises this project team, it feels like a personal compliment.		
Relationship conflict	0.85	Jehn (1995)
How much friction was there among members in your project team?		
How much were personality conflicts evident in your project team?		
How much tension was there among members in your project team?		
How much emotional conflict was there among members in your project team?		
Task conflict	0.81	Jehn (1995)
How often did people in your project team disagree about opinions regarding the work being done?		
How frequently were there conflicts about ideas in your project team?		
How much conflict about the work you did was there in your project team?		
To what extent were there differences of opinion in your project team?		
Process conflict	0.82	Shah and Jehn (1993)
How much disagreement was there about procedures in your project team?		
To what extent did you disagree about the way to do things in your project team?		
How frequently were there disagreements about who should do what in your project team?		

Dyadic conflict I have experienced conflict with her / him.		-
Peer evaluation Please rate overall participation of every teammate.		-
Satisfaction Please indicate how satisfied you were with: 1. Project team in general 2. Project team members 3. Project processes	0.83	Kunin (1955)
Performance Compared with other group projects you are working with or have worked with in the past, please rate the performance of the team on the following dimensions: 1. Efficiency 2. Quality 3. Adherence to schedule/ budget 4. Work excellence	0.88	Ancona and Caldwell (1992)

Subgroup identification was measured by three items adapted from Hinkle, Taylor and Fox-Cardamone (1989) and Allen and Meyer (1990), each rated on a five point scale (1=strongly disagree, 5=strongly agree). Respondents were asked to indicate their identification with the collocated subgroups along cognitive (e.g., "I identify with teammates in the same location") and emotional (e.g., "I feel emotionally attached to teammates in the same location") dimensions of identification. The Cronbach's alpha score for this measurement was 0.87.

3.4.2 Team Identification

Team identification was measured by four items adapted from Mael and Tetrick's (1992) "identification with a psychological group scale", each rated on a five point scale (1=strongly disagree, 5=strongly agree). Respondents indicated their identification with the teams along cognitive (e.g., "When I talk about this project team, I usually say 'we' rather than 'they'") and emotional (e.g., "When someone

praises this project team, it feels like a personal compliment") dimensions of identification. The Cronbach's alpha was 0.73.

3.4.3 Team Conflict

Relationship and task conflict were measured by the intragroup conflict scale (Jehn, 1995). Relationship conflict was measured by four questions such as "How much friction was there among members in your team?" Task conflict was measured by four questions such as "How often did people in your team disagree about opinions regarding the work being done?" Process conflict was measured by the scale developed by Shah and Jehn (1993). The items included three questions such as "How much disagreement was there about procedures in your team?" All the questions were rated on a five-point Likert scale (1=not at all, 5=very much). The Cronbach's alpha scores for the scales of relationship, task and process conflict were 0.85, 0.81 and 0.82, respectively.

3.4.4 Dyadic Conflict

In order to differentiate between the conflict with collocated teammates and the conflict with distant teammates, participates were asked to rate the statement "I have experienced conflict with her / him" for each individual teammate, on a five-point Likert scale (1=strongly disagree, 5=strongly agree). Average scores of "conflict with collocated teammates" and "conflict with distant teammates" were calculated.

3.4.5 Peer Evaluation

Participants were asked to rate the participation of each individual teammate on a five-point Likert scale (1=very poor, 5=excellent). Average scores of "evaluation of

collocated teammates" and "evaluation of distant teammates" were calculated.

3.4.6 Intergroup Bias

Intergroup bias is operationalized as the difference between the evaluative ratings of the ingroup and the outgroup (Lipponen et al., 2003). In this study, it was measured by subtracting the evaluation of distant teammates from the evaluation of collocated teammates.

3.4.7 Satisfaction

Satisfaction was measured by the "female face scale" (Kunin, 1955). The respondents indicated how satisfied they were with the team in general, their group members, and the task processes using 11 female faces that varied from frowning to smiling. The Cronbach's alpha score for the three items was 0.83.

3.4.8 Performance

The measure of performance was adapted from Ancona and Caldwell (1992). Respondents were required to rate the team performance along four dimensions of performance: efficiency, quality, adherence to schedule and budget, and work excellence on a five-point scale (1-poor, 5=excellent). The Cronbach's alpha score was 0.88.

3.4.9 Control Variables

Team size, subgroup size, gender, age and previous virtual team experience were included as control variables. Subgroup configuration, which is the pattern of team member distribution, has been found to affect team processes (O'Leary & Mortensen, 2008; Polzer et al., 2006). Indicator variables are used to represent whether an

individual belongs or does not belong to a certain category. Therefore three indicator variables were created to represent three patterns of member distribution. They were "balanced subgroup (if an individual belongs to a balanced subgroup)", "subgroup with minority members (if an individual belongs to a subgroup with minority members)" and "subgroup with majority members (if an individual belongs to a subgroup with majority members)".

Chapter 4 Results

4.1 Descriptive Statistics

Table 4 summarizes the descriptive statistics and correlations between the variables. Team members demonstrated certain degree of identification with the collocated subgroups (M = 3.55, SD = 0.95). Compared to the subgroup identification, team identification was higher (M = 3.95, SD = 0.71). The correlation between subgroup identification and team identification was not significant (r = .170, P > .05). This indicated that identification with the geographic subgroup did not preclude developing team identification. People were able to hold dual identities simultaneously. Besides, people tended to evaluate collocated teammates more positively than distant teammates (M = 4.22 vs. M = 3.77), which was consistent with the notion of ingroup-outgroup differentiation. However, conflict with collocated teammates was comparable to conflict with distant teammates (M = 2.61 vs. M = 2.55).

4.2 Hypothesis Testing

A series of multiple regression analyses were conducted to test the hypotheses. As mentioned before, team size, subgroup size, gender, age, previous virtual team experience and three indicator variables of subgroup configuration were included as control variables. Since none of these variables, except for three indicator variables of subgroup configuration, were significantly linked to the primary variables, nor did they affect the pattern of results, they were excluded from further analysis. According to Dielman (2001), only m-1 of the indicator variables are needed to indicate m

Table 4 Descriptive Statistics and Correlations between Variables

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1.Subgroup identification	3.55	0.95											
2. Team identification	3.95	0.71	.170										
3. Relationship conflict	2.53	0.79	.118	-.093									
4. Task conflict	2.86	0.66	-.069	-.057	.623**								
5. Process conflict	2.42	0.71	.029	-.194	.711**	.741**							
6. Conflict with collocated teammates	2.61	1.04	-.158	-.342*	.578**	.528**	.476**						
7. Conflict with distant teammates	2.55	1.01	.035	-.164	.382*	.110	.145	.631**					
8. Evaluation of collocated teammates	4.22	0.58	.417**	.113	.002	-.322	-.146	-.197	.055				
9. Evaluation of distant teammates	3.77	0.64	-.020	.182	-.306	-.377*	-.364*	-.247	-.221	.413*			
10. Intergroup bias	0.43	0.66	.374*	-.090	.301	.099	.218	.064	.244	.482**	-.599**		
11. Satisfaction	7.93	1.53	.000	.192	-.561**	-.596**	-.650**	-.500**	-.182	.300	.456**	-.182	
12. Performance	3.78	0.62	-.030	.315	-.111	-.170	-.281	-.285	-.199	.215	.149	.035	.528**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

groups. Therefore, only two indicator variables, “balanced subgroup” and “subgroup with minority members”, were kept in the regression models. Another indicator variable, “subgroup with majority members”, was considered as the baseline group and excluded from the regression models.

As for Hypotheses 1 and 2, multiple regression analyses were conducted to test how subgroup identification and team identification influenced the evaluation of teammates and intergroup bias. Table 5 summarizes the results of regression analyses.

In the first set of hypotheses, it was predicted that subgroup identification would be positively related to evaluation of collocated teammates (H 1a), as well as intergroup bias (H 1b). The results of regression analyses indicated a positive relationship between subgroup identification and evaluation of collocated teammates ($\beta = .394$, $p < .05$), and a positive relationship between subgroup identification and intergroup bias ($\beta = .406$, $p < .05$). Thus both Hypothesis 1a and 1b were supported.

In Hypothesis 2, it was predicted that team identification would be positively related to evaluation of distant teammates (H 2a) and negatively related to intergroup bias (H 2b). There was no significant relationship found between team identification and evaluation of distant teammates ($\beta = .235$, $p > .05$), or intergroup bias ($\beta = -.227$, $p > .05$). Thus Hypothesis 2a and 2b were not supported.

As for Hypothesis 3, 4 and 5, in order to avoid the multicollinearity problem, three types of team conflict, conflict with collocated teammates, and conflict with distant teammates were entered separately to the regression models as independent

Table 5 Results of Regression Analyses Predicting Evaluation of Teammates and Intergroup Bias

Independent Variable	Evaluation of collocated teammates	Evaluation of distant teammates	Intergroup bias
Balanced subgroup	.228	.410*	-.197
Subgroup with minority members	-.113	.265	-.411*
Subgroup identification	.394*	-.076	.406*
Team identification	.028	.235	-.227
R-Square	.257	.199	.314
Adjusted *R*-Square	.157	.096	.223
F	2.588	1.929	3.436*
df	4, 30	4, 31	4, 30

* $p<0.05$

Table 6 Results of Regression Analyses Predicting Performance

Independent Variable	Step1	Step2	Step3	Step4	Step5
Balanced subgroup	.152	.110	.086	.118	.167
Subgroup with minority members	-.012	-.030	-.045	-.037	.046
Subgroup identification	-.089	-.099	-.078	-.117	-.086
Team identification	.325	.321	.283	.261	.313
Relationship conflict	-.040	-	-	-	-
Task conflict	-	-.119	-	-	-
Process conflict	-	-	-0.199	-	-
Conflict with collocated teammates	-	-	-	-.185	-
Conflict with distant teammates	-	-	-	-	-.148
R-Square	.134	.145	.165	.162	.152
Adjusted *R*-Square	-.010	.002	.026	.018	.010
F	0.932	1.015	1.190	1.125	1.074
Df	5, 30	5, 30	5, 30	5, 29	5, 30

Table 7 Results of Regression Analyses Predicting Satisfaction

Independent Variable	Step1	Step2	Step3	Step4	Step5
Balanced subgroup	.257	.157	.167	.285	.395*
Subgroup with minority members	.092	.065	.060	.146	.246
Subgroup identification	.020	-.075	-.006	-.093	-.043
Team identification	.158	.184	.090	.084	.203
Relationship conflict	-.491**	-	-	-	-
Task conflict	-	-.529**	-	-	-
Process conflict	-	-	-.578**	-	-
Conflict with collocated teammates	-	-	-	-0.434*	-
Conflict with distant teammates	-	-	-	-	-.202
R-Square	.391	.402	.448	.328	.208
Adjusted *R*-Square	.289	.303	.357	.213	.076
F	3.847**	4.038**	4.878**	2.835*	1.580
df	5, 30	5, 30	5, 30	5, 29	5, 30

* $p<0.05$

** $p<0.01$

Table 8 Summary of Results of Hypothesis Testing

Hypothesis	Result
H 1a: Subgroup identification will be positively related to evaluation of collocated teammates.	Supported
H 1b: Subgroup identification will be positively related to intergroup bias.	Supported
H 2a: Team identification will be positively related to evaluation of distant teammates.	Not supported
H 2b: Team identification will be negatively related to intergroup bias.	Not supported
H 3a: Relationship conflict will be negatively related to team performance.	Not supported
H 3b: Task conflict will be negatively related to team performance.	Not supported
H 3c: Process conflict will be negatively related to team performance.	Not supported
H 4a: Relationship conflict will be negatively related to satisfaction.	Supported
H 4b: Task conflict will be negatively related to satisfaction.	Supported
H 4c: Process conflict will be negatively related to satisfaction.	Supported
H 5a: Conflict with collocated teammates will be more negatively related to team performance than will conflict with distant teammates.	Not supported
H 5b: Conflict with collocated teammates will be more negatively related to satisfaction than will conflict with distant teammates.	Partially supported

variables to predict performance as well as satisfaction. Table 6 and 7 summarize the results of regression analyses.

In Hypothesis 3, it was predicted that all three types of team conflict would be negatively related to performance. The results of regression analyses indicated no significant relationship found between relationship conflict and performance (β =-.040, $p > .05$). Similarly, there was no significant relationship found between performance and task conflict (β = -.119, $p > .05$), or process conflict (β = -.199, $p > .05$). Thus Hypothesis 3a, 3b, and 3c were not supported.

In Hypothesis 4, it was predicted that all three types of team conflict would be negatively related to satisfaction. As predicted, the results of regression analyses indicated a negative relationship between satisfaction and relationship conflict (β = -.491, $p < .01$), task conflict (β = -.529, $p < .01$) and process conflict (β = -.578, $p < .01$). Thus Hypothesis 4a, 4b, and 4c were supported.

In Hypothesis 5, the impact of conflict with collocated teammates was expected to be more detrimental to performance (H 5a) and satisfaction (H 5b) compared to that of conflict with distant teammates. As for Hypothesis 5a, there was no significant relationship found between performance and conflict with collocated teammates (β = -.185, $p > .05$), or conflict with distant teammates (β = -.148, $p > .05$). Therefore Hypothesis 5a was not supported. As for Hypothesis 5b, conflict with collocated teammates was found to be negatively related to satisfaction (β = -.434, $p < .05$), while no significant relationship was found between conflict with distant teammates and satisfaction (β = -.202, $p > .05$). Therefore Hypothesis 5b was partially supported.

4.3 Interview Findings

4.3.1 Subgroup Formation

The interview findings demonstrated that geographic difference tends to be a salient category for self-categorization in virtual teams. People frequently referred to their teammates in the distant location as “Hong Kong team” or “Netherlands team”, even though they were actually in the same team. Besides, in coincidence with the findings of Armstrong and Cole (1995), team members often referred to colleagues at the same location as “us” and team members at the distant site as “them”.

Some team members indicated the perception of subgroup formation based on geographic locations. Subgroup boundary became explicit when two sites “confronted” with each other during team meetings. As one team member (female, 23-year-old) told the researcher,

> “We had several people together here, and they had several people there. We were familiar with each other among ourselves, and they were familiar with each other among themselves. Sometimes it’s like two cliques. For example, when there was conflict during the video conferencing, we cut off the microphone line and had some discussion among ourselves. We did not connect the line until we achieved the consensus. They also did things like that. Sometimes they kept far away from the microphone on purpose. We could hear their talking but couldn’t figure out what they were exactly talking about. After a while they came back to the microphone.”

People even expressed the feeling that one team acted like two separate teams.

As one team member (male, 25-year-old) said,

> "I think……most of the time, it was like two separate teams, you know, two separate teams working on different parts of the project and trying to put things together. We met (on Skype) only once a week, so it's very different from a face to face team that everyone is in the same geographic region. If everybody is in the same geographic region, you know, once I want to schedule a meeting, I can call you anytime, so we can sit together and solve the problem together. But when it comes to working in a virtual team, it's not like that, so I feel it's more like two separate teams".

He went on to explain why he had such feelings. It was partly because there was few brainstorming and decision making at the team level.

> "The communication between us was more about reporting what had been done, and keeping each other updated. It's not like sitting down together and solving the problem together. It's not like one whole team."

Usually teams divided the task into different parts and people in the same location worked on the same subtask. Subtasks were assigned according to skills and resources. It was more likely that people in the same location have similar functional backgrounds and share same resources. As one team member (male, 25-year-old) mentioned,

> "They had strong background in supply chain, and the problem of the project was mainly about supply chain, so basically they were in charge of the technical part. Our value to this project was more about supplemental support

because we had more resources compared to them. So we were in charge of interviews, such as interviewing alumni or professors. We also did library research. We delivered our collected information to them and saw how they could get inspiration from it."

Subgroup salience became intensified when the geographic difference aligns with the cultural difference. As one team member (male, 30-year-old) said,

"I think there was cultural difference in our team……western culture versus eastern culture……We were more aggressive, and more willing to express our opinions. Well, they were more reserved."

4.3.2 Inter-subgroup Relations

In line with the survey results, findings from the interviews demonstrated that inter-subgroup relations were characterized by ingroup favoritism. However, inters-subgroup relations may not be negatively affected by subgroup categorization since ingroup favoritism does not necessarily develop into outgroup antagonism.

People tended to evaluate contribution of collocated teammates more positively than that of distant teammates. As one team member (male, 22-year-old) mentioned,

"We contributed a lot to this project, and what we did was very helpful for the final report. Some of the interviews they did were critical, however, most of them had duplicate information."

Another team member (male, 25-year-old) also felt his collocated subgroup contributed more to the project compared to the distant subgroup. He said,

"In terms of quantity or quality, things they did were not as good as

what we did. We contributed more to the final presentation and final report. I feel they could have done more."

Subgroup relations may not be negatively affected by the formation of geographic subgroups. As one team member (male, 30-year-old) noted,

"We had the same goal. Due to the geographic difference, and due to the limited face to face communication, we had some disadvantage in communication…….distant communication was not as efficient as face to face meetings…….But, the relations between two sites was not affected. We were in a good relation."

Although inter-subgroup conflict did occur sometimes, it was not necessarily a sign of unhealthy inter-subgroup relations. As one team member (male, 29-year-old) told the researcher,

"People here got together, while people in the other site got together. Some people may think this was not good. Well, I don't think so. Usually we spent some time to reach the consensus before meeting with them. Sometimes they were against our ideas. There were some idea collisions between two sites. Anyway, finally we agreed with each other."

4.3.3 Team Identity

The survey data demonstrated that people on average identified with the team (M = 3.95, SD = 0.71). Team identity was built up partly by having people from different locations working on the same part of the project. As one team member (male,

29-year-old) noted,

> "We worked as a whole team. For example, when we wrote the report, it's not that we did this part, and they did that part. It's not like that. If part one was written by two of them and one of us, part two would be written by two of us and one of them."

By contrast, team identity was less strong when people at different locations were working on different parts of the project. As another team member (male, 22-year-old) told the researcher about his experience of team identification,

> "There was no cross section, which means we both did this section. It was very clear that we did this section, and they worked on the other section…… Kind of as we started to put it together, surely we started to feel like a team. I think feeling like a team only happened at the end of the project, when we actually saw each other, and were working on the same thing."

4.3.4 Team Conflict

Findings from the interviews demonstrated that task conflict could trigger relationship conflict if people expressed ideas in an impolite way. As one team member (female, 22-year-old) told the researcher,

> "When there was disagreement, most of us were very polite. However, there was one tough guy. He always thought he was right. His impolite attitude put people with different opinions in an awkward position. Everyone was unhappy that night. "

The topic of process conflict frequently came up in the interviews. Conflict arose when some of the team members did not meet the deadline, or did not produce good-quality deliverables. As one team member (male, 22-year-old) said,

> "One time, one person just did not have anything, or there was no analysis at all. He just found two things and put them together. We kind of had trouble understanding them. We had to go and do the research ourselves, later. That was one problem we had. Another problem was that people did not show up at all in the meeting. There was one team member, he just didn't show up. That was a lot tougher. There was no way to solve it. You have no power to fire them. There is no way to go and complain to the teacher. The way we solved that, we just assigned the things that were less important to the person, in the hope that if he didn't do, that wouldn't be a big deal."

In line with the survey findings, process conflict was perceived to be detrimental to satisfaction. As the same team member continued to explain the impact of the process conflict,

> "It did impact how much you were able to deliver to the client. Instead of delivering four really strong parts, you delivered maybe three strong parts. We had to cut down certain things. We had to cut down other things that were not deep. The other impact was like, that was a lot of frustration."

4.3.5 Conflict with Collocated Teammates and Conflict with Distant Teammates

Although the survey data indicated that the amount of conflict with distant teammates was comparable to the amount of conflict with collocated teammates (M = 2.55 versus M = 2.61), findings from interviews conveyed the idea that conflict with distant teammates was less likely to be confronted. As one team member (male, 25-year-old) told the researcher about his perception of the conflict between two sites,

> "I think partially due to the geographic distance, sometimes we did not want to trigger the conflict. It is like long distance relationship, and it is very fragile. Once the conflict is triggered, it is very difficult to resolve. That's why we did not want to trigger the conflict."

By contrast, conflict with collocated teammates was more likely to be expressed openly. The same team member continued to express his opinion of the conflict within the locational subgroup,

> "However, for us in the same geographic region, we expressed our ideas more openly. We were less concerned about triggering conflict. Even if the conflict was triggered, what we were thinking about was that maybe we could resolve it later. "

Besides, conflict with distant teammates was less likely to be taken personally. As one team member (male, 29-year-old) talked about disagreements with teammates at the other site,

> "There was little face to face contact. If you were against someone's opinion, you could just say it. You don't need to worry too much about his feelings. People are less likely to take it personally. People tended to

be more objective."

One team member (male, 25-year-old) mentioned that people might have different expectations for collocated teammates and distant teammates. He said,

"We didn't have high expectation of good-quality work from them…Yes, for me, my expectation for people here and people in the other end were different."

Although his statement was not really referred to the expectation of conflict, it at least pointed out the idea that people have different expectations for collocated teammates and distant teammates.

Chapter 5 Discussion

As Cramton and Hinds (2005) noted, among the large number of studies done in the area of subgroup dynamics, few of them have focused on subgroups within work teams. One of the reasons why there is not much research on subgroup dynamics within work teams may be the difficulty of defining the subgroup boundary. Whether a particular social category becomes salient partially depends on how it fits the information available (Oakes, 1987). Therefore the basis for self-categorization may change as a response to the change of the context. Teams in which subgroup boundary is more explicit, such as "factional teams" or virtual teams, become a good context to study subgroup dynamics. Global virtual teams, in particular, are an ideal context to understand the formation, dynamics and effects of subgroups within work teams (Cramton & Hinds, 2005). Therefore this study is designed to situate in the context of global virtual teams and examine inter-subgroup relations between geographic subgroups. Overall, the findings of this study demonstrated that technology may help people overcome spatial, temporal and organizational boundaries, but may not necessarily erase social and psychological boundaries.

First, the study found that subgroup identification was positively related to intergroup bias. The more team members identified with the collocated subgroups, the more intergroup bias they would demonstrate towards distant teammates. This finding provides empirical support for an important assumption of previous research. Previous research approached the issue of subgroup dynamics from the social identity perspective and reasoned the harmful ingroup-outgroup dynamics were resulted from

subgroup categorization. However, they did not specifically measure identification (O'Leary & Mortensen, 2008; Polzer et al., 2006). For example, Polzer et al. (2006) explained the intense conflict and low trust found within two-subgroup teams by arguing that subgroup identification would become especially strong when two subgroups are equal in size and power. Without measuring people's identification with geographic subgroups, it is not clear whether the unhealthy intergroup dynamics is caused by subgroup identification or other extraneous variables. Findings of this study supports the notion that ingroup-outgroup dynamics between geographic subgroups are primarily caused by social categorization. Therefore the intense conflict and low trust found within two-subgroup teams by Polzer et al. (2006) was highly likely to be caused by strong subgroup identification rather than other extraneous variables.

Besides, this study found the intergroup bias was largely in the form of favorable evaluation of collocated teammates. Although the ingroup favoritism may escalate into negative intergroup relations, this does not necessarily occur all the time. It has been found that ingroup favoritism can turn into outgroup derogation when there is negative emotions (e.g., anger, contempt) during the intergroup encounters (Hewstone et al., 2002). For instance, threat is recognized as one of the factors to trigger negative emotions. When the outgroup is perceived as a threat to the ingroup's norms or distinctiveness, it is likely to elicit anger and fear and negatively affects intergroup relations (Brewer, 2001). Linking this idea to the faultline research, it provides a possible explanation for the mixed findings of the relationship between faultline strength and group outcomes. Suppose strong faultline is equal to strong subgroup

identification as most of the previous research has assumed (although this idea has been doubted earlier in Chapter 2, Section 2.1.1.2). Strong subgroup identification leads to increased intergroup bias and ingroup favoritism, but not necessarily triggers increased outgroup antagonism or intergroup conflict. The relationship between faultline strength and group outcomes is likely to be influenced by some moderating factors. Without identifying moderating factors, previous faultline research is unsurprisingly to yield inconsistent findings.

Second, neither the hypothesized positive relationship between team identification and evaluation of distant teammates, nor the negative relationship between team identification and intergroup bias was significant in this study. Therefore this study fails to support the common ingroup identity model. A possible explanation is that a superordinate identity may threaten the subgroup distinctiveness, thus intergroup bias will be increased rather than reduced, especially for those people who are highly identified with the subgroup (Hornsey & Hogg, 2000). To evaluate this reasoning, the moderating role of subgroup identification was tested. However, when the interaction term (subgroup identification * team identification) was entered in the regression model, the changes in R^2 was not significant. The interaction term was not significant in predicting intergroup bias ($\beta = -.725$, $p > .05$). Therefore this possible explanation was not supported.

Although the effects of team identification did not reach statistical significance, all of them were in the hypothesized direction. Besides, the common ingroup identity model has received ample empirical support and widely accepted to be an effective

model for reducing intergroup bias. Therefore, this study's failure to support this model may be largely due to the small sample size. In the situation of small sample size, random error is likely to obscure real trends. Consequently, hypothesized relationships do not reach statistical significant even if the trends are real.

Third, this study found that all three types of team conflict were detrimental to satisfaction. Conflict has been consistently found to have negative impact on satisfaction in collocated teams. Conflict elicits frustration and anxiety, and consequently diminishes satisfaction. Since satisfaction is negatively related to absenteeism and turnover (Griffeth, Hom, & Gaertner, 2000), the harmful impact of conflict on satisfaction should be taken note of.

By contrast, the relationship between conflict and performance was not significant, regardless of the type of conflict. The failure to find a significant effect is not surprising, given that the findings of the impact of conflict on performance in virtual teams seem to be different from that in collocated teams. For example, whereas the relationship conflict has been consistently found to be detrimental to performance in collocated teams, findings from the virtual teams are mixed (Hinds & Mortensen, 2005; Mortensen & Hinds, 2001). The relationship between task conflict and performance is vague in collocated teams, however, it is consistently found to be negative in virtual teams (Hinds & Mortensen, 2005; Mortensen & Hinds, 2001). Therefore it appears that the existing models derived from the collocated teams may not be well applied to the context of virtual teams. It suggests that adaptation of the models is necessary in order to be fit into the context of virtual teams.

Another reason why conflict affects satisfaction but not performance may be the difference in the complexity of the two group outcomes. Whereas satisfaction is easily be affected by negative emotions resulted from conflict, the issue of performance is more complicated. For example, whether team performance will benefit from task conflict partially depends on how the team utilizes information. In other words, the link between conflict and performance is likely to be affected by some moderating factors. Factors such as task characteristics (Jehn, 1995) or conflict resolution strategies have been recognized as possible moderating variables.

Finally, perhaps the most interesting finding in this study was that conflict with collocated teammates was harmful to satisfaction, whereas conflict with distant teammates was not. This finding suggests that it is important to consider social and psychological factors when assessing the impact of group processes (e.g., conflict) on group outcomes (e.g., satisfaction). One such important factor is expectation. Expectancy violations theory identifies the influential role of expectancies in people's interaction patterns and interaction outcomes (Burgoon, 1995). Although this study did not measure people's expectations of conflict, findings from the interviews indicated that people did have different expectations for collocated teammates and distant teammates. Consequently, conflict is likely to be perceived as an expectancy violation or as an expectancy confirmation, depending on whether the conflict occurred between the self and collocated teammates or distant teammates.

Another important factor worth consideration when assessing the impact of group processes on group outcomes is subgroup boundary. Ingroup-outgroup

differentiation resulted from the formation of the subgroup boundary is not only likely to create different expectations as aforementioned, but also likely to influence information processing. For example, Philips (2003) found people were better able to recognize and use new information from outgroup members than that from ingroup members. Given that the positive impact of task conflict on performance largely depends on utilization of new information, the ingroup-outgroup differentiation is crucial to predict the effect of task conflict. However, previous research tends to measure group processes by group-level constructs, and consequently neglects issues created by the subgroup boundary. Results of this research suggest that future research should pay more attention to the issue of subgroup boundary.

Much attention has been given to the ingroup-outgroup dynamics between sites rather than dynamics within the collocated subgroups. Findings of this study suggest that more research of collocated subgroups is needed in order to better understand the dynamics of virtual teams.

Chapter 6 Conclusion

6.1 Significance of the Study

The findings of this study contribute to the evolving literature on subgroup dynamics within work teams in several ways. First, the results of the study provide empirical support for the notion that ingroup-outgroup dynamics between geographic subgroups are primarily caused by social categorization (O'Leary & Mortensen, 2008; Polzer et al., 2006). The study demonstrated that identification with geographic subgroups plays a significant role in influencing how team members act in virtual teams.

Second, by showing that intergroup bias was primarily in the form of ingroup enhancement, this study proposes a possible explanation for the mixed results in the faultline research. Past faultline research mostly measured the direct relationship between faultline strength, group processes and outcomes, and tended to neglect some moderating variables. This study is valuable in drawing more attention to when and how faultlines negatively affect group processes and outcomes.

Third, the findings of this study showed that social and psychological factors moderate the relationship between group processes and group outcomes. Previous studies on the contingent effect of conflict mostly focused on the task related factors such as task interdependence and task complexity (e.g., Kankanhalli et al., 2006), or conflict resolution factors (Montoya-Weiss, Massey, & Song, 2001). This study makes a useful contribution by extending the analytical model to include social and psychological factors such as expectation and subgroup boundary. Since it is difficult

to identify issues created by subgroup boundary through team-level analysis, this study suggests more use of subgroup-level and individual-level analysis in teams with potential subgroup boundaries.

6.2 Practical Implications

This study also has some practical significance. First, managers of virtual teams should be aware of the ingroup-outgroup differentiation created by geographic subgroup categorization. Although intergroup bias is largely in the form of ingroup favoritism, it may transfer into negative intergroup relations under certain conditions. Therefore certain strategies should be implemented to prevent the development of ingroup favoritism into outgroup antagonism. For example, in order to avoid the negative emotions which are antecedents of outgroup harm (Hewstone et al., 2002), equal status and resource allocation among geographic sites should be maintained.

Second, apart from dealing with inter-subgroup dynamics, managers are recommended to pay attention to dynamics within the collocated subgroups. It is worth the effort to identify conflict within collocated subgroups at an earlier stage and resolve the conflict in an appropriate way.

Finally, managers need to see the value of expectancy in shaping team members' interactions. In the case of a diversified workforce within the geographic subgroups, managers should remind the team members to expect diversified opinions and beliefs among the collocated teammates. Therefore, when conflict arises within the geographic subgroups, it will be less likely to be perceived as an expectancy violation. Consequently the negative impact of conflict on satisfaction will be alleviated.

6.3 Limitations

Before concluding the study, it is important to mention some limitations to the study. First of all, the small sample size was suffered from more random errors compared to a large sample size. Thus it was less likely to uncover statistically significant findings based on a small sample size.

Second, although the chosen teams for study to some extent were very similar to virtual teams in business organizations, such teams formed within the university context have been criticized as lacking power differentials that are prevalent in the real organizational environment (Tucker & Panteli, 2003). Participants of the study also mentioned that there were less accountability, professionalism and immediate feedback in student projects compared to real organizational projects. Therefore the results of the study should be generalized with caution.

Third, organizational affiliation is a covariate of geographic distribution in this study, such that people in the same location were also from the same organization. Although this is always the case for many virtual teams, the results of this study should be generalized with caution to teams with different patterns of composition.

Finally, the measure of team performance and conflict suffered from common methods problem (Feldman & Lynch, 1988). Given that the responses to the questions of conflict will be likely to influence the answers to the questions of performance and vice versa, their presence in the same survey instrument casts doubt on the validity of these two constructs. External measures of performance, such as the final grades would be more appropriate. Besides, due to the space limitations in the questionnaires,

dyadic conflict was measured by a single item. Thus it is not known whether the type of dyadic conflict would influence the results.

6.4 Directions for Future Study

This study has several suggestions for future research. First, the results of this study need to be validated in teams with more geographic sites, teams with various tasks and teams within various organizations. Also it will be interesting to know how the subgroup dynamics will change as teams evolve over time.

Second, the relationship between subgroup identification and team identification is still unclear in the context of virtual teams. Does subgroup identification weaken the shared team identity? Can people have both strong subgroup identities and strong team identities simultaneously? Is the relationship between these two variables influenced by moderating factors? These questions need to be answered in the future research.

Finally, future research should include the measures of expectations such as expectation of conflict and expectation of fellow teammates. The findings of this study indicated that expectations were likely to moderate the impact of conflict on satisfaction. Future research should take this into consideration and explore other social and psychological factors.

6.5 Conclusion

In conclusion, this study made an attempt to understand subgroup dynamics in global virtual teams. The findings also shed light on subgroup dynamics within collocated work teams. As teams increasingly become important units in organizations,

the issue of inter-subgroup relations also becomes significant. Therefore more research should be encouraged to further understandings about this crucial issue.

References

Abrams, D., & Hogg, M. A. (1988). Comments on the motivational status of self-esteem in social identity and intergroup discrimination. *European Journal of Social Psychology, 18*(4), 317-334.

Allen, N. J., & Meyer, J. P. (1990). The measurement and antecedents of affective, continuance and normative commitment to the organization. *Journal of Occupational Psychology, 63*(1-18).

Allen, V. L., & Wilder, D. A. (1975). Categorization, beliefs similarity, and intergroup discrimination. *Journal of Personality and Social Psychology, 32*, 971-977.

Allen, V. L., & Wilder, D. A. (1979). Group categorization and attribution of belief similarity. *Small Group Research, 10*(1), 73-80.

Ancona, D. G., & Caldwell, D. F. (1992). Bridging the boundary: External activity and performance in organizational teams. *Administrative Science Quarterly, 37*(4), 634-665.

Armstrong, D. J., & Cole, P. (1995). Managing distances and differences in geographically distributed work groups. In S. E. Jackson & M. N. Ruderman (Eds.), *Diversity in work teams : research paradigms for a changing workplace* (pp. 187-216). Washington, DC: American Psychological Association.

Brewer, M. B. (1979). Ingroup bias in the minimal intergroup situation: A cognitive-motivational analysis. *Psychological Bulletin, 86*, 307-324.

Brewer, M. B. (1999). The psychology of prejudice: Ingroup love or outgroup hate? *Journal of Social Issues, 55*(3), 429-444.

Brewer, M. B. (2001). Ingroup identification and intergroup conflict: When does ingroup love become outgroup hate? In R. Ashmore, L. Jussim & D. Wilder (Eds.), *Social Identity, Intergroup Conflict, and Conflict Reduction* (pp. 17-41). New York: Oxford Univ. Press.

Burgoon, J. K. (1978). A communication model of personal space violations: Explication and an initial test. *Human Communication Research, 4*(2), 129-142.

Burgoon, J. K. (1995). Cross-cultural and intercultural applications of expectancy violations theory. In R. L. Wiseman (Ed.), *Intercultural Communication Theory* (pp. 194-214). Thousand Oaks, CA: Sage.

Byrne, D. (1971). *The Attraction Paradigm*. New York: Academic Press.

Cramton, C. D. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organization Science, 12*(3), 346-371.

Cramton, C. D., & Hinds, P. J. (2005). Subgroup dynamics in internationally distributed teams: Ethnocentrism or cross-national learning? In *Research in Organizational Behavior: an Annual Series of Analytical Essays and Critical Reviews, Vol 26* (Vol. 26, pp. 231-263). New York: Jai-Elsevier Science Inc.

De Dreu, C. K. W., & Weingart, L. R. (2003). Task versus relationship conflict, team performance, and team member satisfaction: A meta-analysis. *Journal of Applied Psychology, 88*(4), 741-749.

Dielman, T. E. (2001). *Applied Regression Analysis for Business and Economics* (3rd ed.). Pacific Grove, CA: Duxbury Press.

Feldman, J. M., & Lynch, J. G. (1988). Self-generated validity and other effects of measurement on belief, attitude, intention, and behavior. *Journal of Applied Psychology, 73*(3), 421-435.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117-140.

Fiol, C. M., & O'Connor, E. J. (2005). Identification in face-to-face, hybrid, and pure virtual teams: Untangling the contradictions. *Organization Science, 16*(1), 19-32.

Gaertner, S. L., & Dovidio, J. F. (2000). *Reducing Intergroup Bias: The Common Ingroup Identity Model*. Philadelphia, PA: Psychology Press.

Gaertner, S. L., Dovidio, J. F., Anastasio, P. A., Bachman, B. A., & Rust, M. C. (1993). The common ingroup identity model: Recategorization and the reduction of intergroup bias. In W. Stroebe & M. Hewstone (Eds.), *European Review of Social Psychology* (Vol. 2, pp. 247-278). Chichester, UK: Wiley.

Gaertner, S. L., Dovidio, J. F., Nier, J. F., Banker, B., Ward, C., Houlette, M., et al. (2000). The common ingroup identity model for reducing intergroup bias: Process and challenges. In D. Capozza & R. J. Brown (Eds.), *Social Identity Processes: Trends in Theory and Research* (pp. 133-148). London: Sage.

Gaertner, S. L., Mann, J., Murrell, A., & Dovidio, J. F. (1989). Reducing intergroup bias: The benefits of recategorization. *Journal of Personality and Social Psychology, 57*(2), 239-249.

Gaertner, S. L., Rust, M. C., Dovidio, J. F., Bachman, B. A., & Anastasio, P. A. (1994). The contact hypothesis: The role of a common ingroup identity on reducing intergroup bias. *Small Group Research, 25*(2), 224-249.

Gergen, K. J. (1971). *The Concept of Self*. New York: Holt, Rinehart & Winston.

Gibson, C. B., & Cohen, S. G. (2003). *Virtual Teams that Work : Creating Conditions for Virtual Team Effectiveness* (1st ed.). San Francisco: Jossey-Bass.

Gibson, C. B., & Vermeulen, F. (2003). A healthy divide: Subgroups as a stimulus for team learning behavior. *Administrative Science Quarterly, 48*(2), 202-239.

Gonzalez, R., & Brown, R. (2003). Generalization of positive attitude as a function of subgroup and superordinate group identifications in intergroup contact. *European Journal of Social Psychology, 33*(2), 195-214.

Griffeth, R. W., Hom, P. W., & Gaertner, S. (2000). A meta-analysis of antecedents and correlates of employee turnover: update, moderator tests, and research implications for the next millennium. *Journal of Management, 26*(3), 463-488.

Hewstone, M., Rubin, M., & Willis, H. (2002). Intergroup bias. *Annual Review of Psychology, 53*(1), 575-575.

Hinds, P. J., & Bailey, D. E. (2003). Out of sight, out of sync: Understanding conflict in distributed teams. *Organization Science, 14*(6), 615-632.

Hinds, P. J., & Kiesler, S. (2002). *Distributed Work*. Cambridge, Mass.: MIT Press.

Hinds, P. J., & Mortensen, M. (2005). Understanding conflict in geographically distributed teams: The moderating effects of shared identity, shared context, and spontaneous communication. *Organization Science, 16*(3), 290-307.

Hinkle, S., Taylor, L. A., Foxcardamone, D. L., & Crook, K. F. (1989). Intragroup identification and intergroup differentiation: A multicomponent approach. *British Journal of Social Psychology, 28*, 305-317.

Hogg, M. A. (2000). Subjective uncertainty reduction through self-categorization: A motivational theory of social identity processes. *European Review of Social Psychology, 11*, 223-223.

Hogg, M. A., & Abrams, D. (1988). *Social Identifications: A Social Psychology of Intergroup Relations and Group Processes*. New York: Routledge.

Hogg, M. A., & Terry, D. J. (2000). Social identity and self-categorization processes in organizational contexts. *Academy of Management Review, 25*(1), 121-140.

Holtz, R., & Miller, N. (1985). Assumed similarity and opinion certainty. *Journal of Personality and Social Psychology, 48*(4), 890-898.

Hornsey, M. J., & Hogg, M. A. (1999). Subgroup differentiation as a response to an overly-inclusive group: A test of optimal distinctiveness theory. *European Journal of Social Psychology, 29*(4), 543-550.

Hornsey, M. J., & Hogg, M. A. (2000). Assimilation and diversity: An integrative model of subgroup relations. *Personality and Social Psychology Review, 4*(2), 143-156.

Jarvenpaa, S. L., & Leidner, D. E. (1999). Communication and trust in global virtual teams. *Organization Science, 10*(6), 791-815.

Jehn, K. A. (1994). Enhangcing effectivess-An investigation of advantages and disadvantages of value-based intragroup conflict. *International Journal of Conflict Management, 5*(3), 223-238.

Jehn, K. A. (1995). A Multimethod examination of the benefits and detriments of intragroup conflict. *Administrative Science Quarterly, 40*(2), 256-282.

Jehn, K. A. (1997). Qualitative analysis of conflict types and dimensions in organizational groups. *Administrative Science Quarterly, 42*(3), 530-557.

Jehn, K. A., Northcraft, G. B., & Neale, M. A. (1999). Why differences make a difference: A field study of diversity, conflict, and performance in workgroups. *Administrative Science Quarterly, 44*(4), 741-763.

Kankanhalli, A., Tan, B. C. Y., & Wei, K. K. (2006). Conflict and performance in global virtual teams. *Journal of Management Information Systems, 23*(3), 237-274.

Kilduff, M., Angelmar, R., & Mehra, A. (2000). Top management-team diversity and firm performance: Examining the role of cognitions. *Organization Science, 11*(1), 21-34.

King, J. L., & Frost, R. L. (2002). Managing distance over time: The evolution of technologies of dis/ambiguation. In P. Hinds & S. Kiesler (Eds.), *Distributed Work* (pp. 3-26). Cambridge, MA: MIT Press.

Kunin, T. (1955). The construction of a new type of attitude measure. *Personnel Psychology*, *8*, 65-78.

Lau, D. C., & Murnighan, J. K. (1998). Demographic diversity and faultlines: The compositional dynamics of organizational groups. *Academy of Management Review, 23*(2), 325-340.

Lau, D. C., & Murnighan, J. K. (2005). Interactions within groups and subgroups: The effects of demographic faultlines. *Academy of Management Journal, 48*(4), 645-659.

Li, J. T., & Hambrick, D. C. (2005). Factional groups: A new vantage on demographic faultlines, conflict, and disintegration in work teams. *Academy of Management Journal, 48*(5), 794-813.

Lipnack, J., & Stamps, J. (1997). *Virtual Teams : Reaching across Space, Time, and Organizations with Technology*. New York: Wiley.

Lipponen, J., Helkama, K., & Juslin, M. (2003). Subgroup identification, superordinate identification and intergroup bias between the subgroups. *Group Processes & Intergroup Relations, 6*(3), 239-250.

Lovelace, K., Shapiro, D. L., & Weingart, L. R. (2001). Maximizing cross-functional new product teams' innovativeness and constraint adherence: A conflict communications perspective. *Academy of Management Journal, 44*(4), 779-793.

Mael, F. A., & Tetrick, L. E. (1992). Identifying organizational identification. *Educational and Psychological Measurement, 52*(4), 813-824.

Marks, G., & Miller, N. (1982). Target attractiveness as a mediator of assumed attitude similarity. *Personality and Social Psychology Bulletin, 8*(4), 728-735.

Marks, G., Miller, N., & Maruyama, G. (1981). Effect of targets' physical attractiveness on assumptions of similarity. *Journal of Personality and Social Psychology, 41*(1), 198-206.

Maznevski, M. L., & Chudoba, K. M. (2000). Bridging space over time: Global virtual team dynamics and effectiveness. *Organization Science, 11*(5), 473-492.

Montoya-Weiss, M. M., Massey, A. P., & Song, M. (2001). Getting it together: Temporal coordination and conflict management in global virtual teams. *Academy of Management Journal, 44*(6), 1251-1262.

Mortensen, M., & Hinds, P. J. (2001). Conflict and shared identity in geographically distributed teams. *International Journal of Conflict Management, 12*(3), 212-238.

O'Leary, M. B., Hill, C., & Cummings, J. N. (2007). The spatial, temporal, and configurational characteristics of geographic dispersion in teams. *Mis Quarterly, 31*(3), 433-452.

O'Leary, M. B., & Mortensen, M. (2008). Friends and enemies wthin: The roles of subgroups, imbalance, and isolates in geographically dispersed teams. MIT Sloan Research Paper No. 4689-08 Available at SSRN: http://ssrn.com/abstract=1096188.

Oakes, P. J. (1987). The salience of social categories. In J. C. Turner, M. A. Hogg, P. J. Oakes, S. D. Reicher & M. S. Wetherell (Eds.), *Rediscovering the Social Group: A Self-categorization Theory* (pp. 117-141). Oxford: Blackwell.

Panteli, N., & Davison, R. M. (2005). The role of subgroups in the communication patterns of global virtual teams. *Ieee Transactions on Professional Communication, 48*(2), 191-200.

Pelled, L. H., Eisenhardt, K. M., & Xin, K. R. (1999). Exploring the black box: An analysis of work group diversity, conflict, and performance. *Administrative Science Quarterly, 44*(1), 1-28.

Phillips, K. W. (2003). The effects of categorically based expectations on minority influence: The importance of congruence. *Personality and Social Psychology Bulletin, 29*(1), 3-13.

Polzer, J. T., Crisp, C. B., Jarvenpaa, S. L., & Kim, J. W. (2006). Extending the faultline model to geographically dispersed teams: How colocated subgroups can impair group functioning. *Academy of Management Journal, 49*(4), 679-692.

Rahim, M. A. (2001). *Managing Conflict in Organizations* (3rd ed.). Westport, Conn.: Quorum Books.

Rink, F., & Ellemers, N. (2006). What can you expect? The influence of gender diversity in dyads on work goal expectancies and subsequent work commitment. *Group Processes & Intergroup Relations, 9*(4), 577-588.

Rockmann, K. W., Pratt, M. G., & Northcraft, G. B. (2007). Divided loyalties - Determinants of identification in interorganizational teams. *Small Group Research, 38*(6), 727-751.

Shah, P., & Jehn, K. (1993). Do friends perform bettern than acquaintances? The interaction of friendship, conflict and task. *Group Decision and Negotiation, 2*(2), 149-166.

Stone, C. H., & Crisp, R. J. (2007). Superordinate and subgroup identification as predictors of intergroup evaluation in common ingroup contexts. *Group Processes & Intergroup Relations, 10*(4), 493-513.

Tajfel, H. (1972). Social categorization. English manuscript of 'La catégorisation sociale'. In S. & Moscovici (Eds.), *Introduction à la Psychologie Sociale* (pp. 272-302). Paris: Larousse.

Tajfel, H., Billig, M. G., Bundy, R. P., & Flament, C. (1971). Social categorization and intergroup behaviour. *European Journal of Social Psychology, 1*(2), 149-178.

Tajfel, H., & Turner, J. C. (1979). An integrative theory of social conflict. In W. G. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33-47). Monterey: Brooks/Cole.

Thatcher, S. M. B., Jehn, K. A., & Zanutto, E. (2003). Cracks in diversity research: The effects of diversity faultlines on conflict and performance. *Group Decision and Negotiation, 12*(3), 217-241.

Tucker, R., & Panteli, N. (2003). Back to basics: Shared goals and developing trust in global virtual teams. . In M. Korpela, R. Montealegre & A. Poulymenakou (Eds.), *Organizational Information Systems in the Context of Globalization* (pp. 85-98). Norwell, MA: Kluwer.

Turner, J. C. (1985). Social categorization and the self-concept: A social cognitive theory of group behavior. In E. J. Lawler (Ed.), *Advances In Group Processes: Theory And Research* (Vol. 2, pp. 77-122). Greenwich, CT: JAI Press.

Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987). *Rediscovering the Social Group: A Self-categorization Theory*. Oxford: Basil Blackwell.

van Knippenberg, D., & Schippers, M. C. (2007). Work group diversity. *Annual Review of Psychology, 58*, 515-541.

Vodosek, M. (2007). Intragroup conflict as a mediator between cultural diversity and work group outcomes. *International Journal of Conflict Management, 18*(3-4), 345-375.

Wegner, D. M. (1987). Transactive memory: A contemporary analysis of the group mind. In B. Mullen & G. R. Geothals (Eds.), *Theories of Group Behavior* (pp. 185-208). New York: Springer-Verlag.

Williams, K. Y., & O'Reilly, C. A. (1998). Demography and diversity in organizations: A review of 40 years of research. *Research in Organizational Behavior, 20*, 77-140.

Appendix A: Survey Questionnaire

Part 1 Demographic Questions

1. Your initials: _____
2. Gender

   ☐ Male ☐ Female
3. How old are you? _____
4. What is your nationality? _____
5. Ethnicity: _____
6. Working experience

   ☐ None ☐ below 1 year ☐ 1-3 years ☐ 4-6 years ☐ 7-9 years ☐ 10 years or above
7. Please indicate you are a / an _____ student.

   ☐ graduate ☐ Undergraduate
8. What is your Major? _____
9. Are you a full-time student?

   ☐ Yes ☐ No
10. Have you ever been part of a virtual team before? (Virtual teams: usually formed when geographical separations cannot be bridged. They are composed of members who rarely, if ever, meet face to face. Among members, communications are mainly through internet, telephone and video conferencing.)

    ☐ Never ☐ Once ☐ Twice ☐ Three times ☐ Four times or more

Part 2 Please answer the following questions about collaboration process in your project team.

1. Please indicate how frequently you communicated with every teammate and rate overall participation they showed in this global virtual team project:

Teammate	Communication frequency	Participation
1)	☐Never☐Rarely ☐Sometimes☐Often ☐Very often	☐Very Poor☐Poor☐Average☐Good☐Excellent
2)	☐Never☐Rarely ☐Sometimes☐Often ☐Very often	☐Very Poor☐Poor☐Average☐Good☐Excellent
3)	☐Never☐Rarely ☐Sometimes☐Often ☐Very often	☐Very Poor☐Poor☐Average☐Good☐Excellent
4)	☐Never☐Rarely ☐Sometimes☐Often ☐Very often	☐Very Poor☐Poor☐Average☐Good☐Excellent
5)	☐Never☐Rarely ☐Sometimes☐Often ☐Very often	☐Very Poor☐Poor☐Average☐Good☐Excellent
6)	☐Never☐Rarely ☐Sometimes☐Often ☐Very often	☐Very Poor☐Poor☐Average☐Good☐Excellent

2. Please indicate the degree to which you agree or disagree with the statement for each teammate.

Name of teammate	"I have experienced conflict with her / him."
1)	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
2)	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
3)	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
4)	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
5)	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
6)	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

3. Please respond to the following questions by indicating the degree to which you agree or disagree with the statement.

I identify with teammates in the same location.	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
I feel emotionally attached to teammates in the same location.	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
I feel a strong sense of belonging to teammates in the same location.	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

I identify with teammates with same nationality.	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
I feel emotionally attached to teammates with same nationality.	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
I feel a strong sense of belonging to teammates with same nationality.	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

Part 3 Based on your collaboration experience of working in this global virtual team, please answer the following questions.

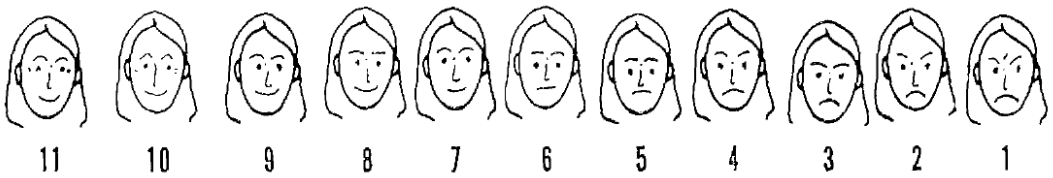
1. Please respond to the following questions by indicating the degree to which you agree or disagree with the statement.

I'm very interested in what others think about this project team.	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
When I talk about this project team, I usually say "we" rather than "they".	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
This project team's successes are my successes.	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
When someone praises this project team, it feels like a personal compliment.	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

2. Please answer the following questions about the extent to which differences in opinions and disagreements occur within the team.

How much friction was there among members in your project team?	☐Not at all ☐Little ☐Some ☐Much ☐Very Much
How much were personality conflicts evident in your project team?	☐Not at all ☐Little ☐Some ☐Much ☐Very Much
How much tension was there among members in your project team?	☐Not at all ☐Little ☐Some ☐Much ☐Very Much
How much emotional conflict was there among members in your project team?	☐Not at all ☐Little ☐Some ☐Much ☐Very Much
How often did people in your project team disagree about opinions regarding the work being done?	☐Not at all ☐Little ☐Some ☐Much ☐Very Much
How frequently were there conflicts about ideas in your project team?	☐Not at all ☐Little ☐Some ☐Much ☐Very Much
How much conflict about the work you did was there in your project team?	☐Not at all ☐Little ☐Some ☐Much ☐Very Much
To what extent were there differences of opinion in your project team?	☐Not at all ☐Little ☐Some ☐Much ☐Very Much
How much disagreement was there about procedures in your project team?	☐Not at all ☐Little ☐Some ☐Much ☐Very Much
To what extent did you disagree about the way to do things in your project team?	☐Not at all ☐Little ☐Some ☐Much ☐Very Much

3. Look at the following female faces:



(1) Please indicate how satisfied you were with your project team in general: ____

(2) Please indicate how satisfied you were with your project team members: ____

(3) Please indicate how satisfied you were with the project processes: _____

4. Compared with other group projects you are working with or have worked with in the past, please rate the performance of the team on the following dimensions:

Efficiency	☐Very Poor☐Poor☐Average☐Good☐Excellent
Quality	☐Very Poor☐Poor☐Average☐Good☐Excellent
Adherence to schedule/ budget	☐Very Poor☐Poor☐Average☐Good☐Excellent
Work excellence	☐Very Poor☐Poor☐Average☐Good☐Excellent

5. For more information, I would like to have a short email or telephone interview with you. It will take less than 30 minutes, and you are asked to describe experience of working in this global virtual team. Would you like to participate in this interview when you are convenient?

☐ Yes Please leave your email address here:_____

☐ No

Appendix B: Informed Consent Form

You are being invited to participate in a research study of global virtual team collaboration. The objective of this study is to identify the formation and impact of subgroups in global virtual teams.

Your kind participation in the interview is sought since you have attended the Global Project Coordination course. Ten people are invited to attend in all. We estimate that it will take about half an hour to finish.

There are no risks associated with the study. The benefits, which may reasonably be expected to result from the study, are both for research and practice and will result in better understanding of global virtual team collaboration. It is up to you to decide whether or not to take part. Refusal to take part will involve no penalty or loss of benefits to which you are otherwise entitles.

All information you provide will be kept strictly confidential and will only be used for the purpose of this academic research. To protect your privacy, you will be assigned an identification number. All information you provide with will be stored only with the identification number, not with the name. The interview recording files will be destroyed after the research is complete. Respondents will not be identified in any report or publication of this study.

This study is being conducted by Biyun Pan under the supervision of Dr. Hichang Cho. For an independent opinion regarding the research and the right of research participants, you may contact a staff member of the National University of Singapore Institutional Review Board (Attn: Mr Chan Tuck Wai, at telephone 065-6516 1234 or email at irb@nus.edu.sg)

If you have any question regarding the survey, please contact Biyun Pan, g0600637@ nus.edu.sg, Tel: (65) 9734-3111 or Dr. Hichang Cho, cnmch@nus.edu.sg, Tel: (65) 6516-8755, Communications and New Media Programme, Faculty of Arts and Social Sciences, National University of Singapore.

I have read and understand the information presented above, and I freely give my consent to participate in this study.

Signature:_____ Date_____

Appendix C: Interview Guideline

1. Was it your first time participating in such a virtual team? How do you feel about it compared to traditional face to face teams?

2. What did you do during the face to face meetings? How do you feel about the face to face meetings?

3. Can you describe the workflow of your team? How did you divide your work? Did you have any leader in the team?

4. How and when did you communicate with your collocated teammates and distant teammates? Were you familiar with every team member?

5. What do you think of the relationship between two sites? Did the team act like a whole team or two subgroups within a team? Do you have any specific examples?

6. What do you think of working with teammates with the same ethnicity?

7. Did you have any conflict in your team? Could you please give me specific examples?

8. What do you think of the impact of the conflict? Was the impact of conflict with collocated teammates different from conflict with distant teammates?

9. How do you feel about the participation of your collocated teammates and distant teammates? How did the perception of the participation influence your experience of working in this team?

10. Generally speaking, how do you feel about the experience of working in this team?